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May 31, 2005

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Subject: Licensee Event Report 50-458 / 05-001-01
River Bend Station – Unit 1
Docket No. 50-458
License No. NPF-47

File Nos. G9.5, G9.25.1.3

RBG-46444
RBF1-05-0065

Ladies and Gentlemen:

In accordance with 10CFR50.73, enclosed is the subject Licensee Event Report. This is a supplement to the original report filed on March 9, 2005. This document contains no commitments.

Sincerely,

David N. Lorfing
Manager – Licensing

DNL/dhw
Enclosure

IE22

cc: U. S. Nuclear Regulatory Commission
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NRC Sr. Resident Inspector
P. O. Box 1050
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NRC FORM 366 (6-2004) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 06/30/2007

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by Internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
River Bend Station – Unit 1	05000 458	1 of 4

4. TITLE
Unplanned Manual Scram Due to Indication of Ground Fault in Main Generator

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
01	15	2005	2005	- 001 -	01	05	31	2005		05000
									FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE
1

10. POWER LEVEL
100

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*

- ☐ 20.2201(b)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- ☐ 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ☐ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☒ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☐ 50.73(a)(2)(v)(B)
- ☐ 50.73(a)(2)(v)(C)
- ☐ 50.73(a)(2)(v)(D)
- ☐ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ☐ OTHER

Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
David N. Lorfing, Manager – Licensing (acting)	225-381-4157

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
na									

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On January 15, 2005, at 2:12 a.m. CST, while the plant was operating at 100 percent power, a manual reactor scram was initiated. This action was procedurally required in response to an alarm received at 2:10 a.m. which indicated a ground fault in the main generator. The plant shutdown proceeded normally, and safety systems responded as required. This event is being reported in accordance with 10CFR50.73(A)(2)(iv)(a) as a condition that required the manual actuation of the reactor protection system. Reactor water level was adequately controlled by the main feedwater system. No actuations of emergency core cooling systems, reactor safety relief valves, or standby diesel generators were required. The ground fault alarm relay was found to be overly sensitive to a low ground current, causing it to actuate early. Absent an intrusive internal examination of the generator, the most likely cause of the ground leakage current is deposition of copper oxide in the rectifier banks. These deposits resulted from an abnormally low dissolved oxygen concentration in the stator water cooling system due to a small hydrogen leak into the system. There were no safety systems out of service at the time of the event. This event was of minimal safety significance.

REPORTED CONDITION

On January 15, 2005, at 2:12 a.m. CST, while the plant was operating at 100 percent power, a manual reactor scram was initiated. This action was procedurally required in response to an alarm (**ALM**) received at 2:10 a.m. which indicated a ground fault in the main generator (**TG**). The plant shutdown proceeded normally, and safety systems responded as required. Reactor water level was adequately controlled by the main feedwater system. No actuations of emergency core cooling systems, reactor safety relief valves, or standby diesel generators were required. There were no safety systems out of service at the time of the event. This event is being reported in accordance with 10CFR50.73(A)(2)(iv)(a) as a condition that required the manual actuation of the reactor protection system.

INVESTIGATION AND IMMEDIATE CORRECTIVE ACTIONS

Troubleshooting activities were initiated to determine the cause for the generator field ground alarm. An inspection of the generator exciter system was performed, and no evidence of damage was found. Resistance checks performed on the rotor, rectifier banks, and transformers found that the readings were acceptable to confirm that no ground was present. The machine field ground detector relays were found in the tripped condition. These were reset and the alarm cleared. This indicated that the ground condition was no longer present. Portions of the field control circuitry were individually isolated in an attempt to assure that no real ground occurred.

Testing of the relay (**74**) which actuates the ground fault alarm found it to be out of calibration, such that it was much more sensitive to ground currents than specified. Technicians recalibrated the relay and restored it to service. Additional testing was performed during plant startup with the turbine at rated speed. This testing did not find any grounds present on the system.

Following plant startup, monitoring of the main generator determined that a small ground existed in the system and that the ground current was slowly increasing. The results of the initial investigation were re-evaluated in light of this new indication. Inspections of the affected equipment determined that one of the five rectifier (**RECT**) banks in the generator excitation control system was the source of the ground, and it was removed from service. Contingency plans were developed for operation in this condition with conservative trigger points built in, including a decision step to remove the unit from service if necessary.

In the interim, there have been indications of a hydrogen leak into the generator stator cooling system. Such leaks affect stator cooling water chemistry as well as stator corrosion properties. Deposition of stator corrosion products in the rectifier cooling tubes is considered to be the most likely cause of the generator field ground. The unit

was shut down on February 19 to perform a partial investigation of this hydrogen leak, and other work.

CAUSAL ANALYSIS

Inspection of the generator rectifier banks found deposits of foreign material in the coolant tubing, which are believed to be copper oxides. These deposits are consistent with the recent water chemistry of the generator stator cooling system. A small hydrogen leak from the generator into the cooling system is having the effect of depleting dissolved oxygen (DO) in the water. The recommended concentration of DO in the stator water cooling system is 2 – 8 parts per million (ppm). Samples taken on February 7th indicated a DO concentration of 0.10 ppm. Operational experience with this system in the industry has found that concentrations below 1 ppm lead to accelerated corrosion, resulting in formation of copper oxides. These compounds are electrically conductive, which can lead to the development of current leakage paths detected as a ground fault.

Vendor information concerning operation of the stator water cooling system recommends maintaining the DO concentration in the range of 2 – 8 ppm. While discussion of this parameter is contained in the body of the document, the "recommended actions" section refers to a minimum value of 0.5 ppm as the threshold for corrective measures to raise the concentration.

CORRECTIVE ACTION TO PREVENT RECURRENCE

A temporary modification has been installed on the stator water cooling system to allow addition of air in order to maintain the dissolved oxygen content. The hydrogen leakage into the system is being frequently monitored, and contingency plans were implemented to facilitate the decision to remove the unit from service should the hydrogen leakage rate reach a predetermined threshold value. Also, the ground detection system has been verified to be functioning correctly to confirm the validity of any future alarms.

The operating limits for dissolved oxygen concentration in the stator water cooling system have been revised to raise the minimum acceptable value from 1 ppm to 2 ppm.

Sections of rectifier coolant tubing found to be most susceptible to causing ground current paths due to fouling with copper oxide deposits have been replaced.

Plans are being developed to repair the generator should the hydrogen leakage threshold established in the operational contingency be exceeded, or in the event of a forced outage of sufficient duration.

PREVIOUS OCCURRENCE EVALUATION

No previous scram at River Bend has been necessitated by indication of a ground fault in the main generator.

SAFETY SIGNIFICANCE

The plant responded as designed to the manual scram, and no actuations of emergency core cooling systems, reactor safety relief valves, or standby diesel generators were required. This event was of minimal safety significance.

(NOTE: Energy Industry Component Identification codes are annotated as (**XX**).)